CLAIMS

I claim:

1. A method comprising:

forming a silicon germanium layer on a substrate in a processing chamber;

removing, in the processing chamber, a portion of the silicon germanium layer;

smoothing, in the processing chamber, a surface of the silicon germanium layer; and

forming a silicon layer on the smoothed surface of the silicon germanium layer.

2. The method of Claim 1, wherein the substrate is not removed from the processing chamber until after the silicon layer is formed.

3. The method of Claim 2, wherein the processing chamber is kept under vacuum from a time at least as early as during removal of a portion of the silicon germanium layer until after completion of formation of the silicon layer.

4. The method of Claim 1, wherein forming the silicon germanium layer comprises:

forming a first layer of silicon germanium on a silicon substrate, wherein the first layer has an increasing concentration of germanium throughout a thickness of the first layer; and

forming a second layer of silicon germanium on the first layer of silicon germanium, wherein the second layer has a constant concentration of germanium throughout a thickness of the second layer.

5. The method of Claim 4, wherein forming the first layer comprises:

increasing the concentration of germanium in the first layer so that the concentration of germanium increases by 10% for every micron of the thickness of the first layer.

6. The method of Claim 4, wherein forming the second layer comprises:

including approximately the same concentration of germanium in the second layer as the concentration of germanium in an upper portion of the first layer.

7. The method of Claim 4, wherein the second layer is formed to a thickness between approximately 0.5 and 1 micron.

8. The method of Claim 1, wherein removing comprises:

introducing an etchant to a surface of the silicon germanium layer.

9. The method of Claim 8, wherein the etchant comprises:

at least one of HCl and HBr.

10. The method of Claim 1, wherein a thickness between approximately 0.1 and 0.2 microns of the silicon germanium layer is removed.

11. The method of Claim 1, wherein smoothing comprises:

introducing a smoothing agent to the surface of the silicon germanium layer.

12. The method of Claim 11, wherein the smoothing agent comprises hydrogen.

13. The method of Claim 12, wherein the hydrogen is introduced at a temperature of approximately 1100° Celsius.

14. The method of Claim 1, wherein the silicon layer is formed to a thickness between approximately 50 Å and 1000 Å.

15. An apparatus comprising:

a substrate;

a silicon germanium layer formed on the substrate; and

a silicon layer formed on the silicon germanium layer, wherein the silicon layer has a defect density of less than approximately 10,000 dislocations per square centimeter.

16. The apparatus of Claim 15, wherein the silicon germanium layer comprises:

a first layer of silicon germanium formed on the substrate, wherein the first layer has an increasing concentration of germanium throughout a thickness of the first layer; and

a second layer of silicon germanium formed on the first layer of silicon germanium, wherein the second layer has a constant concentration of germanium throughout a thickness of the second layer.

17. The apparatus of Claim 16, wherein the concentration of germanium in the first layer increases by 10% for every micron of thickness of the first layer.

18. The apparatus of Claim 16, wherein the thickness of the second layer is between approximately 0.5 and 1 micron.

19. The apparatus of Claim 16, wherein the second layer comprises:

approximately the same concentration of germanium in the second layer as the concentration of germanium in an upper portion of the first layer.

20. The apparatus of Claim 15, wherein the silicon layer has a thickness between approximately 50 Å and 1000 Å.

21. A method comprising:

forming a first layer of silicon germanium on a silicon substrate in a processing chamber, wherein the first layer has an increasing concentration of germanium throughout a thickness of the first layer;

forming, in the processing chamber, a second layer of silicon germanium on the first layer of silicon germanium, wherein the second layer has a constant concentration of germanium throughout a thickness of the second layer;

removing, in the processing chamber, a portion of the second layer;

smoothing, in the processing chamber, a surface of the second layer; and

forming a silicon layer on the smoothed surface of the second layer.

22. The method of Claim 21, wherein the substrate is not removed from the processing chamber until after the silicon layer is formed.

23. The method of Claim 22, wherein the processing chamber is kept under vacuum from a time at least as early as during removal of a portion of the second layer until after completion of formation of the silicon layer.

24. The method of Claim 21, wherein forming the first layer comprises:

increasing the concentration of germanium in the first layer so that the concentration of germanium increases by 10% for every micron of the thickness of the first layer.

25. The method of Claim 21, wherein forming the second layer comprises:

including approximately the same concentration of germanium in the second layer as the concentration of germanium in an upper portion of the first layer.

26. The method of Claim 21, wherein removing comprises:

introducing an etchant to a surface of the second layer.

27. The method of Claim 26, wherein the etchant comprises:

at least one of HCl and HBr.

28. The method of Claim 21, wherein smoothing comprises:

introducing a smoothing agent to the surface of the second layer.

29. The method of Claim 28, wherein the smoothing agent comprises hydrogen.